

### **Amendments to the Claims:**

This listing of claims will replace all prior versions and listing of claims in the application:

#### **Listing of Claims:**

1 – 3 (Canceled)

4. (New) A system for processing a speed signal indicative of rotational speed of a turbocharger and produced by a turbocharger speed sensor, comprising:

a rate limiter having an input receiving the speed signal and an output producing a rate limited speed signal; and

an envelope filter having an input receiving the rate limited speed signal and an output producing a filtered and rate limited speed signal.

5. (New) The system of claim 4 wherein the turbocharger speed sensor is an eddy current sensor.

6. (New) The system of claim 4 wherein the rate limiter is a rising rate limiter configured to reduce electromagnetic interference induced spikes in the speed signal.

7. (New) The system of claim 6 wherein the rising rate limiter is configured to sample the speed signal and bound an upper value of the rate limited speed signal as a sum of a preceding speed signal sample value and a rate limit value if a difference

between a current speed signal sample value and the preceding speed signal sample value exceeds a rate limit threshold.

8. (New) The system of claim 6 wherein the rising rate limiter includes:

a first stage rising rate limiter having an input receiving the speed signal and an output producing a first rate limited speed signal, the first stage rising rate limiter configured to sample the speed signal and bound an upper value of the first rate limited speed signal as a sum of a preceding speed signal sample value and a rate limit value if a difference between a current speed signal sample value and the preceding speed signal sample value exceeds a rate limit threshold; and

a second stage rising rate limiter having an input receiving the first rate limited speed signal and an output producing a second rate limited speed signal corresponding to the rate limited signal produced by the rising rate limiter, the second stage rising rate limiter configured to sample the first rate limited speed signal and bound an upper value of the second rate limited speed signal as a sum of a preceding first rate limited speed signal sample value and the rate limit value if a difference between a current first rate limited speed signal sample value and the preceding first rate limited speed signal sample value exceeds the rate limit threshold.

9. (New) The system of claim 4 further including a first order filter having a signal input receiving the rate limited speed signal, a filter constant input receiving a filter constant value and a signal output coupled to the input of the envelope filter, the

first order filter filtering the rate limited signal and providing a resulting first order filtered and rate limited speed signal to the input of the envelope filter.

10. (New) The system of claim 9 wherein the envelope filter is configured to envelope filter the first order filtered and rate limited speed signal and produce at the output of the envelope filter the filtered and rate limited speed signal in the form of an envelope filtered, first order filtered and rate limited speed signal.

11. (New) The system of claim 4 wherein the envelope filter includes:  
a buffer of predefined size N defining the input of the envelope filter and having as an output a moving window having a window size defined by the N size of the buffer with N-1 overlap; and

a MAX unit having an input receiving the output of the buffer and an output defining the output of the envelope filter, the MAX unit selecting as its output the maximum value of the rate limited speed signal values stored within the buffer.

12. (New) The system of claim 4 wherein the envelope filter includes:  
a first order linear filter having an input defining the input of the envelope filter and an output, the first order linear filter receiving the rate limited speed signal and producing at the output of the first order linear filter a first order filtered and rate limited speed signal; and

a non-linear envelope filter having an input receiving the first order filtered and rate limited speed signal and an output producing the filtered and rate limited speed

signal in the form of a non-linear envelope filtered, first order filtered and rate limited speed signal.

13. (New) The system of claim 12 wherein the envelope filter is configured to sample the rate limited speed signal and to compute a difference value as a difference between a current rate limited speed signal sample value and a previous filtered and rate limited speed signal value produced by the envelope filter, the envelope filter producing as a current value of the filtered and rate limited speed signal a sum of the previous filtered and rate limited speed signal value and a product of the difference value and a small filter value if the current rate limited speed signal sample value is greater than the previous filtered and rate limited speed signal value, and to otherwise produce as the current value of the filtered and rate limited speed signal a sum of the previous filtered and rate limited speed signal value and a product of the difference value and a large filter value.

14. (New) The system of claim 13 wherein the envelope filter is further configured to compute the small filter value as a difference between one and a fractional small filter coefficient value, and to compute the large filter value as a difference between one and a fractional large filter coefficient value.

15. (New) The system of claim 4 further including:  
a swallowing capacity control mechanism responsive to a control signal to vary a swallowing capacity of the turbocharger; and

a controller producing the control signal as a function of the filtered and rate limited speed signal and a target speed value.

16. (New) A method of processing a speed signal indicative of rotational speed of a turbocharger and produced by a turbocharger speed sensor, the method comprising the steps of:

rate limiting the speed signal to produce a rate limited speed signal; and  
envelope filtering the rate limited speed signal to produce an envelope filtered and rate limited speed signal.

17. (New) The method of claim 16 wherein the step of rate limiting the speed signal includes:

sampling the speed signal; and  
bounding an upper value of the rate limited speed signal as a sum of a preceding speed signal sample value and a rate limit value if a difference between a current speed signal sample value and the preceding speed signal sample value exceeds a rate limit threshold.

18. (New) The method of claim 16 further including the step of first order filtering the rate limited signal prior to the step of envelope filtering the rate limited speed signal.

19. (New) The method of claim 16 wherein the step of envelope filtering the rate limited speed signal includes:

buffering the rate limited speed signal with an N-size buffer with N-1 overlap; and  
selecting as the envelope filtered and rate limited signal a maximum value of the  
rate limited speed signal values contained within the buffer.

20. (New) The method of claim 16 wherein the step of envelope filtering the rate  
limited speed signal includes:

sampling the rate limited speed signal;  
computing a difference value as a difference between a current rate limited  
speed signal sample value and a previous filtered and rate limited speed signal value  
produced by the envelope filter; and  
producing as a current value of the filtered and rate limited speed signal a sum of  
the previous filtered and rate limited speed signal value and a product of the difference  
value and a small filter value if the current rate limited speed signal sample value is  
greater than the previous filtered and rate limited speed signal value, and otherwise  
producing as the current value of the filtered and rate limited speed signal a sum of the  
previous filtered and rate limited speed signal value and a product of the difference  
value and a large filter value.

21. (New) The method of claim 20 wherein the step of envelope filtering the rate  
limited speed signal further includes:

computing the small filter value as a difference between one and a fractional  
small filter coefficient value; and

computing the large filter value as a difference between one and a fractional large filter coefficient value.

22. (New) The method of claim 16 further including the steps of:  
producing an error signal based on a comparison of the envelope filtered and rate limited speed signal with a target turbocharger speed value; and  
controlling a swallowing capacity of the turbocharger as a function of the error signal.